

ИНДИВИДУАЛЬНЫЕ ЗАДАНИЯ

Задача 1.

Найти общий интервал дифференциального уравнения (ответ представить в виде $\varphi(x, y) = C$ или в явном виде).

1.1. $7x dx - 8x^2 y dy = 6y dy - 3xy^2$

1.2. $x^2 \sqrt{4+y^2} + y' \sqrt{2+x^3} = 0$

1.3. $\sqrt{1+y^2} dx - 2y dy = y \sin^2 x dy$

1.1. $4x dx - 3y dy = 3x^2 y dy - 2xy^2 dx.$

1.2. $x \sqrt{1+y^2} + yy' \sqrt{1+x^2} = 0.$

1.3. $\sqrt{4+y^2} dx - y dy = x^2 y dy.$

1.4. $\sqrt{3+y^2} dx - y dy = x^2 y dy.$

1.5. $6x dx - 6y dy = 2x^2 y dy + 3y^2 dx.$

1.6. $x \sqrt{3+y^2} dx + y \sqrt{2+x^2} dy = 0.$

1.7. $(e^{2x} + 5) dy + ye^{2x} dx = 0.$

1.8. $yy' \sqrt{\frac{2+x^2}{1-y^2}} + 2x = 0$

1.9. $6x dx - 6y dy = 3x^2 y dy - 2xy^2 dx.$

1.10. $x \sqrt{5+y^2} dx + y \sqrt{4+x^2} dy = 0.$

1.11. $y(4 + e^x) dy - e^x dx = 0.$

1.12. $\sqrt{4-x^2} y' + xy^2 + x = 0.$

$$1.13. \quad 2x dx - 2y dy = x^2 y dy - 2xy^2 dx.$$

$$1.14. \quad x\sqrt{4+y^2} dx + y\sqrt{1+x^2} dy = 0.$$

$$1.15. \quad (e^x + 8) dy - ye^x dx = 0.$$

$$1.16. \quad \sqrt{5+y^2} + yy' \sqrt{1-x^2} = 0.$$

$$1.17. \quad 6x dx - y dy = yx^2 dy - 3xy^2 dx.$$

$$1.18. \quad y \ln y + xy' = 0.$$

$$1.19. \quad (1 + e^x) y' = ye^x.$$

$$1.20. \quad \sqrt{1-x^2} y' + xy^2 + x = 0.$$

$$1.21. \quad 6x dx - 2y dy = 2yx^2 dy - 3xy^2 dx.$$

$$1.22. \quad y(1 + \ln y) + xy' = 0.$$

$$1.23. \quad (3 + e^x) yy' = e^x.$$

$$1.24. \quad \sqrt{3+y^2} + \sqrt{1-x^2} yy' = 0.$$

Задача 2.

Найти общий интеграл дифференциального уравнения.

$$2.1. \quad 3y' = 2\frac{y^2}{x^2} + 3\frac{y}{x} - 7$$

$$2.2. \quad xy' = \frac{2y^3 + 2yx^2}{2y^2 + 4x^2}$$

$$2.3. \quad y' = \frac{x+3y}{3y-2x}$$

$$2.4. \quad xy' = \sqrt{x^2 + y^2} + y$$

$$2.5. \quad 2y' = \frac{y^2}{x^2} + 6\frac{y}{x} + 3.$$

$$2.6. \quad xy' = \frac{3y^3 + 4yx^2}{2y^2 + 2x^2}.$$

$$2.7. \quad y' = \frac{x+2y}{2x-y}.$$

$$2.8. \quad xy' = 2\sqrt{x^2 + y^2} + y.$$

$$2.9. \quad 3y' = \frac{y^2}{x^2} + 8\frac{y}{x} + 4.$$

$$2.10. \quad xy' = \frac{3y^3 + 6yx^2}{2y^2 + 3x^2}.$$

$$2.11. \quad y' = \frac{x^2 + xy - y^2}{x^2 - 2xy}.$$

$$2.12. \quad xy' = \sqrt{2x^2 + y^2} + y.$$

$$2.13. \quad y' = \frac{y^2}{x^2} + 6\frac{y}{x} + 6.$$

$$2.14. \quad xy' = \frac{3y^3 + 8yx^2}{2y^2 + 4x^2}.$$

$$2.15. \quad y' = \frac{x^2 + 2xy - y^2}{2x^2 - 2xy}.$$

$$2.16. \quad xy' = 3\sqrt{x^2 + y^2} + y.$$

$$2.17. \quad 2y' = \frac{y^2}{x^2} + 8\frac{y}{x} + 8.$$

$$2.18. \quad xy' = \frac{3y^3 + 10yx^2}{2y^2 + 5x^2}.$$

$$2.19. \quad y' = \frac{x^2 + 3xy - y^2}{3x^2 - 2xy}.$$

$$2.20. \quad xy' = 3\sqrt{2x^2 + y^2} + y.$$

$$2.21. \quad y' = \frac{y^2}{x^2} + 8\frac{y}{x} + 12.$$

$$2.22. \quad xy' = \frac{3y^3 + 12yx^2}{2y^2 + 6x^2}.$$

$$2.23. \quad y' = \frac{x^2 + xy - 3y^2}{x^2 - 4xy}.$$

$$2.24. \quad xy' = 2\sqrt{2x^2 + y^2} + y.$$

Задача 3

Найти решение задачи Коши.

$$3.1. \quad y' - y = x \sin x, \quad y(0) = 0$$

$$3.2. \quad y' - y^2 x = 2x \sin x, \quad y\left(\frac{\pi}{2}\right) = 0$$

$$3.3. \quad y' - y \sin x = \cos x, \quad y(0) = 0$$

$$3.4. \quad y' + y \operatorname{tg} x = \cos^2 x, \quad y\left(\frac{\pi}{4}\right) = \frac{1}{2}.$$

$$3.5. \quad y' - \frac{y}{x+2} = x^2 + 2x, \quad y(-1) = \frac{3}{2}.$$

$$3.6. \quad y' - \frac{1}{x+1} y = e^x (x+1), \quad y(0) = 1.$$

$$3.7. \quad y' - \frac{y}{x} = x \sin x, \quad y\left(\frac{\pi}{2}\right) = 1.$$

$$3.8. \quad y' + \frac{y}{x} = \sin x, \quad y(\pi) = \frac{1}{\pi}.$$

$$3.9. \quad y' + \frac{y}{2x} = x^2, \quad y(1) = 1.$$

$$3.10. \quad y' + \frac{2xy}{1+x^2} = \frac{2x^2}{1+x^2}, \quad y(0) = \frac{2}{3}.$$

$$3.11. \quad y' - \frac{2x-5}{x^2} y = 5, \quad y(2) = 4.$$

$$3.12. \quad y' + \frac{y}{x} = \frac{x+1}{x} e^x, \quad y(1) = e.$$

$$3.13. \quad y' - \frac{y}{x} = -2 \frac{\ln x}{x}, \quad y(1) = 1.$$

$$3.14. \quad y' - \frac{y}{x} = -\frac{8}{x^2}, \quad y(1) = 4.$$

$$3.15. \quad y' + \frac{2}{x} y = x^3, \quad y(1) = -\frac{5}{6}.$$

$$3.16. \quad y' + \frac{y}{x} = 3x, \quad y(1) = 1.$$

$$3.17. \quad y' - \frac{2xy}{1+x^2} = 1+x^2, \quad y(1)=3.$$

$$3.18. \quad y' + \frac{1-2x}{x^2} y = 1, \quad y(1)=1.$$

$$3.19. \quad y' + \frac{3y}{x} = \frac{2}{x^3}, \quad y(1)=1.$$

$$3.21. \quad y' + \frac{xy}{2(1-x^2)} = \frac{x}{2}, \quad y(0) = \frac{2}{3}.$$

$$3.22. \quad y' + xy = -x^3, \quad y(0)=3.$$

$$3.23. \quad y' - \frac{2}{x+1} y = e^x (x+1)^2, \quad y(0)=1.$$

$$3.24. \quad y' + 2xy = x e^{-x^2} \sin x, \quad y(0)=1.$$